"I mean that when, as I fully expect, a new edition is soon called for, you may here and there insert an actual case, to relieve the vast number of abstract propositions. So far as I am concerned, I am so well prepared to take your statements of facts for granted, that I do not think the *pièces justificatives* when published will make much difference, and I have long seen most clearly that if any concession is made, all that you claim in your concluding pages will follow.

"It is this which has made me so long hesitate, always feeling that the case of Man and his Races and of other animals, and that of plants, is one and the same, and that if a *vera causa* be admitted for one instant, of a purely unknown and imaginary one, such as the word 'creation,' all the consequences must follow" (vol. ii. p. 325.

After the first publication of the "Principles" between the years 1830 and 1833, a great part of Lyell's time and thought was given up to revising, enlarging, and re-writing portions of his book during the twelve editions through which it passed. Although many valuable corrections were made in the original work, its scope and arguments being extended, and the whole fortified with a great wealth of new illustrations, it may well be doubted whether this continual re-editing of the book was not attended with some loss in the symmetry of its arrangement and its literary excellence. In a work relating to such a rapidly-advancing science as geology, this result, much as it is to be regretted, could scarcely be avoided; but many disciples of Lyell, while they refer to the last edition as a storehouse of facts, will delight to renew their acquaintance with an old favourite by reading once more the easily flowing periods of the first edition.

We have dwelt at such length upon Lyell's relations to his great work, as illustrated in the interesting volumes before us, that we must defer to a second notice some of the other interesting topics which are suggested by their perusal. JOHN W. JUDD

ORGANIC CHEMISTRY

Adolph Strecker's Short Text-book of Organic Chemistry. By Dr. Johannes Wislicenus, Professor of Chemistry in the University of Würzburg. Translated and edited by W. R. Hodgkinson and A. J. Greenaway. 8vo. (London: Kegan Paul, Trench and Co., 1881.)

THE new edition of Strecker's text-book by Prof. Wislicenus, published in 1874, is well known as giving a concise and comprehensive view of the state of organic chemistry at the time of its publication, and some useful additions, relating to recent discoveries, have been made by the English translators.

The classification of organic compounds in this, as in all recent works on organic chemistry, is based upon the hydrocarbons. All organic compounds of known constitution are divided into the two great groups, Fatty and Aromatic, and in each of these the saturated hydrocarbons—paraffins in the first, benzene and its homologues in the second,—are first described; next their mono-substitution derivatives: alcohols, ethers, amines, phosphines, &c.; then in succession the di-, tri-, tetra-, &c., derivatives. With regard to this matter Prof. Wislicenus says in his preface: "The most systematic arrangement would be found in the number of carbon-atoms in direct union. In each such group of equal carbon contents the paraffin would come first, next those derivatives in which only a single hydrogen-atom had been replaced, these being arranged according to the valency of the substituting element. Then would follow the di-substitution products. . . Next the tri-substituted paraffins. . . . This order of arrangement is very valuable for the study of organic chemistry, more so however for those moderately acquainted with the subject than for beginners. For the latter I think we cannot dispense with the study of homologous series, especially in the early part of a text-book. In this way alone can the clear differentiation of the various categories be made evident, depending, as they do, not so much on the accumulation of carbon-atoms, as on the nature and amount of the other elements in union." It is worth while to compare these remarks with those made by Roscoe and Schorlemmer in their lately-published "Treatise on Organic Chemistry," at p. 129 of which we read:—"Perhaps the most systematic mode of arrangement would be to commence each group (fatty and aromatic) with a discussion of the hydrocarbons, and then to follow on with a description of the series of substances obtained by the replacement of one, two, three, or more of the constituent atoms of hydrogen. Such a mode of classification, however, labours under the disadvantage that compounds which stand as a rule closely together, as, for example, the alcohols $CnH_{2n+2}O$ and the acids $C_nH_{2n}O_2$, are thus found widely separated, whilst other groups possessing but little analogy are brought into proximity. Hence it is desirable, alike for the sake of perspicuity as for the purpose of showing the genetic relationships between different bodies, to depart in many cases from such a systematic treatment, and arrange the compounds according as they are derived one from the other." It will be seen from these quotations that each author regards the arrangement adopted by the other as the most systematic, but prefers his own as best adapted to the requirements of the student.

The additions made to the work under consideration by the English editors belong chiefly to the aromatic group, but no mention is made of the recent investigations of Nevile and Winther, published last year in the Journal of the Chemical Society, on the Bromotoluenes, which are especially interesting on account of the light which they throw on the influence exerted by the groups or radicles which have replaced certain hydrogen-atoms in a benzene nucleus, on the position taken up by other radicles which take the place of the remaining atoms of hydrogen. In the series of paraffins there is an omission of the normal Heptane, lately discovered by Dr. Thorpe in the turpentine of *Pinus Sabiniana;* and amongst the nitroparaffins no notice is taken of the Nitrolic acids and Pseudonitroles. Under the organic compounds of boron we miss Dr. Frankland's Ammonioboric methide, $(CH_3)_3B{=}NH_3$ and Diboric ethopentethylate, $(C_2H_5O)_3B{=}B(C_2H_5)(OC_2H_5)_3$, in which boron figures as a pentad; and under guanidine there is no account of the Guanamines, $C_{n+2}H_{2n+3}N_5$, a series of bases discovered by Nencki in 1874 and 1876, and formed by the action of heat on the guanidine salts of the fatty acids.

The translation reads well, and, with the exception of a few instances of somewhat too close imitation of German forms, is expressed in good idiomatic English. There

are, however, certain irregularities of nomenclature which it may be worth while to notice, partly with the view to correction in future editions, partly because the greater number of them are not peculiar to this work, but are of very frequent occurrence in our chemical literature.

On p. 91 we read: "Carbon monoxide is the common radical of the carbonic acid derivatives, and as such is termed 'carboxyl'"; on the next page the compound CONH is called "carboxylimide"; and on p. 98 we read, "corresponding to carboxyl is the radical CS, thiocarbo*n*yl." Here (and in the original) there is surely an inconsistency; if CS is thiocarbonyl, CO should certainly be called carbonyl; and such in fact is the name hitherto given to it by all writers, whereas carboxyl always denotes the group COOH. By a similar inconsistency the term *Ethyl-carbonic acid* is used on p. 353 as a synonym of propionic acid. Now most readers would probably understand by this term the compound $CO(OC_2H_5)(OH)$, *i.e.* carbonic acid having one of its hydrogen-atoms replaced by ethyl—an acid of which several salts are known—whereas propionic acid is $C_2H_5.COOH$, and its proper synonym is *ethyl-carboxylic acid.* The mistake here made arises from a too close imitation in sound of the German term "Carbonsäure," which, with the prefixes mono-, di-, tri-, was introduced by Kolbe to denote the number of carboxyl-groups, COOH, contained in an organic acid. In many instances however this term is correctly rendered; thus on pp. 557 and 561 we find the acids $C_6H_4(COOH)_2$ spoken of as *benzene-dicarboxylic acids*, though further on (p. 653) the same acids are called *phenylene-dicarbonic acids.* It seems indeed as if the two terminations were used indiscriminately.

Another irregularity of frequent occurrence in English nomenclature is the indiscriminate use of the terminations *in* and *ine*. Dr. Hofmann suggested some years ago that *ine* should be used exclusively for organic bases, and *in* for neutral bodies, such as glucosides, bitter principles, proteids, &c. This rule has been followed by some authors, and the writer of this review has taken some pains to recommend its general adoption; but the two terminations are still, by many writers, used without discrimination. As examples of this in the volume under consideration may be cited, on the one hand, gelatine, cholesterine, and on the other, chondrin, albumin, fibrin, dyslysin, &c. Now the use of special terminations for each group of compounds is very much to be desired; it is by no means an innovation, but, on the contrary, is as old as our systematic nomenclature itself; witness the well-known rule that the names of acids shall end in *ic* and *ous*, and those of the corresponding salts in *ate* and *ite*. To extend this regularity of termination to the names of all classes of compounds, especially in organic chemistry, is a main object of the rules lately issued by the Council of the Chemical Society to the Abstractors for that Society's journal, and its general adoption would certainly lead to a great improvement in our nomenclature in point of regularity.

The habit already noticed of too closely imitating foreign forms sometimes leads to awkwardness of expression in translating, as on p. 103, where it is said that "the paraffins burn easily when heated in an *oxygen-containing* atmosphere" (*in einer sauerstoffhaltenden Atmosphäre*); now it would have been quite as easy, and more in accordance with English usage, to say "in an atmosphere containing oxygen." Similar remarks may be made respecting the expression "carbon-free radical," which occurs on p. 565. It is worth some trouble to keep our language pure, and there is no more fruitful source of corruption in a language than the careless imitation of foreign words and idioms. And here I cannot avoid entering a protest against the use, in English speaking and writing, of the French words *mètre*, *décimètre*, &c., instead of their English equivalents, meter, decimeter, &c. *Meter* is a true English word, and is used both singly and in combination, as in the words barometer, thermometer, gasometer, &c., and there is therefore not the slightest occasion for interlarding our sentences with the French forms in question.

The translation affords also some instances of a very common error, viz. a confusion between the terms *substitution* and *replacement.* These words are indeed commonly regarded as synonymous, whereas they are really correlative, and the relation between them is this: *When* A *comes in and* B *goes out,* A *is substituted for* B, *and* B *is replaced, or displaced, by* A. The common error is to say "substituted," where the proper term would be "replaced." Examples both of the correct and incorrect use of these words may be found on pp. 100 and 101, *e.g.* "The hydrogen-atoms of the paraffins can be replaced . . . . by the halogen-atoms," &c.: this is correct; but a little lower down we find, "By *substitution* of only a single hydrogen-atom . . . ."; it should be by *replacement.* The same mistake occurs on the last line of p. 100; on the other hand the word "replaced" is correctly used in several places on p. 102. It would seem, therefore, that the translators regard the two words in question as synonymous.

Next with regard to notation: Many of the graphic formulæ throughout the volume are unnecessarily drawn out into long vertical columns, where they might with equal clearness have been printed horizontally; in one instance indeed seven formulæ fill up a whole page. In this, however, the English editors have simply followed the practice of the original work; but this was printed in 1874, and since that time it has been found that chemical formulæ may for the most part be printed much more concisely without any sacrifice of clearness. The formula of arsenic trichlorodimethide, for example, which is printed in the form $As\begin{cases}CH_3\\CH_3\\Cl\\Cl\\Cl\end{cases}$, might perhaps have been condensed into $(CH_3)_2AsCl_3$, without doing any great violence to the views of the author.

A more important matter, however, relating to notation is the habitual omission—sanctioned indeed by prevailing usage—of brackets in formulæ, where they ought to be inserted. It is of course unnecessary to insist upon the difference between $2a + b$ and $2(a + b)$, with which every schoolboy becomes familiar at a very early stage of his mathematical studies; but unfortunately it has lately become the fashion to ignore this difference in chemical formulæ, and to represent, for example, two molecules of alcohol by $2C_2H_5.OH$ instead of the proper form, $2(C_2H_5.OH)$. Now the neglect of this difference is of

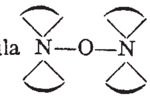
quite recent introduction'; for in chemical books of older date it was always observed, in proof of which see Gmelin's "Handbuch der Chemie" throughout. Gmelin indeed, in the first volume of his great work (4te Auflage, 1843, p. 61, and English Edition, i. 61) lays down the law of the case as follows :—"A number placed before several symbols multiplies them all, *as far as the next + sign or comma;* or if it stands before a bracket, it multiplies all the symbols and numbers included within the brackets." This rule is consistently followed all through the "Handbuch," and, so far as I know, in most contemporary chemical writings; but lately it has fallen into disuse, and a numeral placed before a set of unbracketted symbols is supposed to multiply them all, whether separated by addition-signs (+ , .) or not. Now this last practice would be all very well if consistently followed out; but unfortunately it is not, and hence confusion arises. For example, the formula $2SO_3, H_2O$ is used, sometimes to signify $S_2O_7H_2$, that is to say, one molecule of pyrosulphuric acid, while at other times it is employed to denote $S_2H_3O_4$ or $2SO_4H_2$, *i.e.* two molecules of sulphuric acid, which latter, according to earlier usage, would have been represented by $2(SO_3, H_2O)$. Again, in the formulæ of basic salts we find such expressions as $3Fe_2O_3, SO_3$, and $2Fe_2O_3, 3SO_3$, &c., in which the co-efficient 3 or 2 is understood to multiply only the Fe_2O_3, without affecting the SO_3; these formulæ being in fact identical with $SO_3, 3Fe_2O_3$ and $3SO_3, 2Fe_2O_3$ respectively. Now it is easy to see that this varying practice in the use or omission of brackets must lead to confusion, and it is much to be desired that the rule which formerly prevailed should be restored to use.

In conclusion, I hope it will be understood that the preceding criticisms are offered solely with the view of promoting uniformity in our nomenclature and notation, and by no means in disparagement of the volume under review, which is in every way a useful and valuable addition to English chemical literature. H. WATTS

OUR BOOK SHELF

Inorganic Chemistry, Theoretical and Practical. An Elementary Text-Book. By William Jago, F.C.S., &c. (London: Longmans, Green, and Co., 1881.)

Practical Chemistry. Adapted to the First Stage of the Revised Syllabus of the Science and Art Department. By J. Howard, F.C.S., &c. (London and Glasgow: William Collins, Sons, and Co., Limited, 1881.)

THE first-named of these books is a really good text-book for laboratory use; the experiments are clearly described; most useful "laboratory hints" are given; conclusions are carefully drawn from the experimental data obtained. The methods for proving the definition of boiling point, for illustrating the manufacture of sulphuric acid, and for confirming quantitatively the equation $KClO_3 = O_3 + KCl$, are especially to be praised. The student who works through this book will have laid a good foundation on which he may afterwards build; only let him skip those parts which deal with "chemical philosophy." Why should he begin his chemical career by learning that "combining weight" is synonymous with "atomic weight" (p. 31)? Why should he trouble himself with committing to memory the "atomicity" of the most important elements as given on p. 27 of this book? Why should he draw from the statement of Avogadro's law the erroneous conclusion that "the molecules of all gases are of the same size"? Why should he deceive himself by fancying that the formula  (p. 143) gives him accurate and well-grounded information regarding the molecule of nitrous oxide? No good reason can be given for doing any of these things, therefore let the student use this book as a laboratory guide only, and he will doubtless find it a trustworthy guide.

Could Mr. Howard's chemical philosophy be separated from his directions for conducting experiments, his book might also be recommended to the student of practical chemistry.

Although this book deals with laboratory experiments, one is much tempted to think that the author does not really regard chemistry as an experimental science. He deals with the general principles of chemical science too much from a literary point of view. An instance of this method is found in the preface, where we are told that "in former editions . . . the notation of Dr. Frankland was alone used. . . . In the present edition, however, it has been thought advisable to give, in addition, the notation and formulæ used by Professors Roscoe, Williamson, Thorpe, and others." This sentence is decidedly humorous; it connects so closely phenomena which appear to the student of chemistry to have but little in common.

Authoritative statements from the text-books exert a great influence on the author of this book; witness a sentence on p. 62: "A molecule must have all its bonds engaged, that is, it cannot combine with any substance without altering the arrangement of the atoms. Hence, there must always be an even number of *bonds* in the molecule of any element or in any compound." Nitric oxide is of course formulated as N_2O_2; no hint is given that the molecular formula of this gas is NO.

The first few pages contain many excellent examples of the misuse of that much misused word "force."

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Primitive Traditions as to the Pleiades

MR. JUSTICE HALIBURTON's letter of December 1 (vol. xxv. p. 100) will have been read by many as calling attention to a curious subject. As it refers especially to me, and indeed arises out of my remark on the story of the "Lost Pleiad" in Dawson's "Australian Aborigines" (NATURE, vol. xxiv. p. 530), I now write a few lines in reply. But it will not be possible to discuss properly Mr. Haliburton's ideas as to the Pleiades till he publishes them in full, with the evidence on which he grounds them. It must not be supposed that the subject has been unnoticed till now by anthropologists. That the Pleiades are an important constellation, by which seasons and years are regulated among tribes in distant parts of the world, that they are sometimes worshipped, and often festivals are held in connection with their rising, that their peculiar grouping has suggested such names as the "dancers," or "hen and chickens," and that numbers of myths have been made about them—all this has long been on record, though in a scattered way, and at any rate it is well known to students. Mr. Haliburton's letter shows that he has new information to add to the previous stock, and furthermore that he has formed a theory that the Pleiad beliefs go back to a marvellously remote period in the history of man, when these stars were, as he says, the "central sun" of the religions, calendars, myths, traditions, and symbolism of early ages. If the astronomical evidence is to support so vast a structure as this, it need hardly be said that it must go far beyond what Mr.